

# The ichthyofauna in the influence area of the Lajeado reservoir, Tocantins state, Brazil

**Renata Bartolette,<sup>1</sup> Carolina Santos Vieira, Jamille Ferreira Lima Santos, Carlos Danillo Costa Santos, Jefferson Santos Vitória Luduvise, Tamires Silva Passos, Thiago D'avilla, Bruna Oliveira Nascimento, Dário Ernesto, Fernando Henrique Argolo, Alexandre José Mendonça Aguiar, Fernanda Argolo, Marlene Silva Almeida Pereira, Tainara Farias Santos & Marcelo Fulgêncio Guedes Brito**

Universidade Federal de Sergipe, Departamento de Biologia, Laboratório de Ictiologia, Avenida Marechal Rondon, s/n, Jardim Rosa Elze. CEP: 49100-000. São Cristóvão, Sergipe, Brazil

<sup>1</sup>Corresponding author. E-mail: [rbartolette@gmail.com](mailto:rbartolette@gmail.com)

**Abstract.** Five rivers and 13 streams in the influence area of the Lajeado reservoir (upper-middle Tocantins River) were sampled in 5 expeditions. A total of 194 fish species were recorded and with the Characiformes and Siluriformes predominant, following the observed pattern for the Neotropical region. As expected, the families with greater richness were Characidae, Loricariidae and Cichlidae. Three species listed as Endangered were collected: *Mylesinus paucisquamatus* Jégu & Santos, 1988, *Melanorivulus litteratus* (Costa, 2010) and *Paratrygon aiereba* (Müller & Henle, 1841).

**Key words.** Species inventory; fish fauna; Neotropical Region; Amazon Basin; Characiformes; Siluriformes; endangered species

## INTRODUCTION

The Neotropical freshwater ichthyofauna is the most diversified in the world, with 5,700 species and many more being described every year (ALBERT & REIS 2011). Brazil has the highest diversity of Neotropical freshwater fishes in the world and this great biodiversity is related to the high species richness and endemism in many groups (ABELL et al. 2008).

The Tocantins river basin is one of the most important hydrographic regions of Brazil by containing both a high degree of endemism and high diversity (SANTOS et al. 2004, LUCINDA et al. 2007, ABELL et al. 2008). The Lajeado dam (Luis Eduardo Magalhães Hydroelectric Plant) is in the transition between the upper and middle Tocantins River, municipality of Miracema do Tocantins, Tocantins state. Lajeado dam was completed in October 2001 and formed a large reservoir with 630 km<sup>2</sup>, 180 km long, 8.8 m mean depth. After the dam was finished, the hydrology was permanently changed, which influences the aquatic fauna, including fishes (LUCINDA et al. 2007).

Recent estimates indicate approximately 520 fish species with nearly 30% endemic to the Tocantins basin (LIMA & CAIRES 2011), and most of these species is closely related to the Amazon basin, especially in the lower course (GOULDING

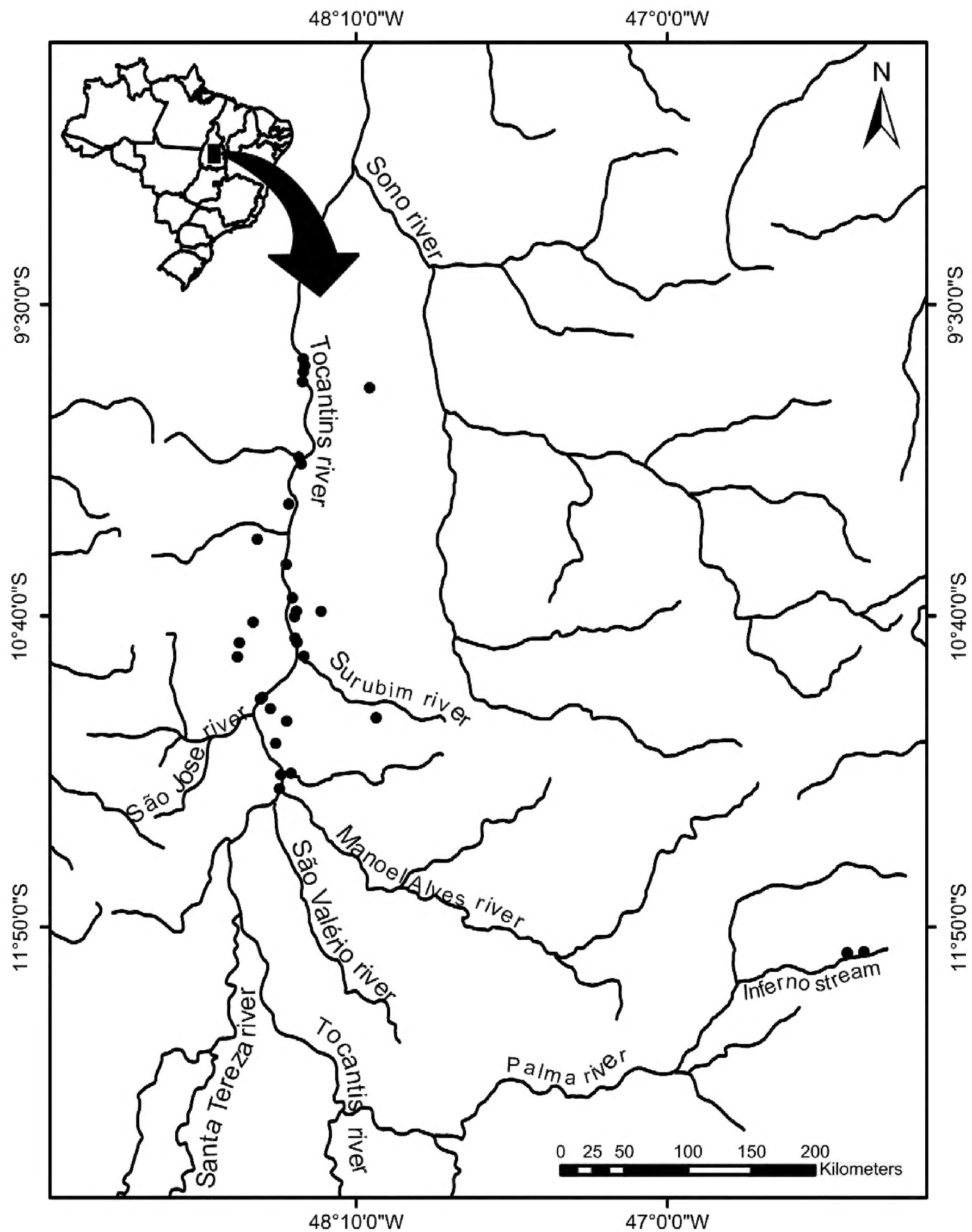
et al. 2003, LIMA & CAIRES 2011). The Tocantins River ichthyofauna is relatively well known when compared with the fish fauna of other Amazonian subsystems; however, many species remain unknown to science or await formal description (LIMA & CAIRES 2011, LUCINDA et al. 2007). During this decade, 15 species were described from the basin: *Anablepsoides tocan-tinensis* (Costa, 2010); *Geophagus neambi* Lucinda, Lucena & Assis, 2010; *Geophagus sveni* Lucinda, Lucena & Assis, 2010; *Hasemanian kalunga* Bertaco & Carvalho, 2010; *Melanorivulus jalapensis* (Costa, 2010); *Sternarchorhynchus axelrodi* Santana & Vari, 2010; *Pimelodus luciae* Rocha & Ribeiro, 2010; *Xyliphius anachoretas* Figueiredo & Britto, 2010; *Moenkhau-sia aurantia* Bertaco, Jerep & Carvalho, 2011; *Moenkhau-sia dasalmas* Bertaco, Jerep & Carvalho, 2011; *Ctenocheiroduon pristis* Malabarba & Jerep, 2012; *Leporinus santosi* Britski & Birindelli, 2013; *Hyphessobrycon diastatos* Dagosta, Marinho & Camelier, 2014; *Serrapinnus aster* Malabarba & Jerep, 2014; *Serrapinnus lucindai* Jerep & Malabarba, 2014.

In the last years, the upper and middle Tocantins river basin has suffered severe alterations from the installation of hydroelectric plants. As result, the presence of these dams altered the natural dynamics of the river and the structure of fish communities (MÉRONA et al. 2010). Thus, the knowledge of fish species richness and their distribution throughout the basin become necessary for their management and conservation. The present study evaluates the fish species richness of the upper-middle Tocantins River in the region of influence of the Lajeado Hydroelectric Power Plant (HPP) in Tocantins, Brazil.

## MATERIAL AND METHODS

### Study site

The Tocantins river basin is composed by the Araguaia and Tocantins rivers, draining an area of 767,000 km<sup>2</sup>, of which 343,000 km<sup>2</sup> corresponds to the Tocantins River, 382,000 km<sup>2</sup> to the Araguaia River and 42,000 km<sup>2</sup> to the Itacaiúnas



**Figure 1.** Map of the study area showing the sampling sites (black dots) in the influence area of the Lajeado reservoir (upper-middle Tocantins river basin), Tocantins state, Brazil.

River (major tributary of the lower course of Tocantins River) (MÉRONA et al. 2010). The Tocantins River drains an approximated area of 343,000 km<sup>2</sup> and the headwaters are in the Serra dos Pirineus, Goiás state, in sedimentary terrains of the Brazilian Shield. The river flows for 2,500 km in a south to north direction through Goiás, Tocantins and Maranhão states, and drains into the Pará River at Belém, Pará state (TUNDISI 2006, MÉRONA et al. 2010).

The rainy season occurs during October to April, with temperatures ranging between 24 and 28 °C, while the dry season occurs between May and September, with temperatures varying from 28 to 35 °C. The period from November to March records the highest rainfall rates, corresponding to 70% of the total annual rainfall (TUNDISI 2006).

The present study was carried out at the reservoir behind the Lajeado dam, as well as rivers and streams under the influence

of this dam, which is located in the upper/middle portion of the Tocantins river basin (09°47' S, 048°02' W).

Data collection

The study is based on five expeditions made over 2 years (August 2013 and October 2013, May 2014 and November 2014, May 2015) in 5 rivers and 13 streams situated across the upper and middle Tocantins River (Fig. 1, Table 1) using active (drag, flue and sieve) and passive (angler and gill nets) fishing gear. The fishes were collected under permit collection ICMBio 44048-2; Naturatins 2175-2015. The specimens captured by active fishing gear were anesthetized with eugenol and fixed in 10% formalin. Specimens collected with passive fishing gear were conditioned in ice, studied at the Universidade Federal de Tocantins (UFT). Species were identified using available literature, keys, and the help of specialists. The taxonomic classification follows REIS et al. (2003) and ESCHMEYER & FONG (2016). Voucher specimens were fixed in 10% formalin, preserved in alcohol 70°GL and deposited in the fish collection of the Universidade Federal de Sergipe (CIUFS), Sergipe state, Brazil.

RESULTS

In this study, 194 species were recorded, belonging to 10 orders and 38 families (Figs. 2, 3, Table 2). The most representative orders were Characiformes (55%), Siluriformes (26%), Perciformes (8%), and Clupeiformes and Myliobatiformes (3%). The remaining orders correspond to 5% of the total species. The predominance of Characidae (25%); Loricariidae (9%); Cichlidae (7%); Anostomidae (6%); Pimelodidae (6%) and Serrasalminidae (5%) was verified. Among all the species captured, 98 were exclusive to active fishing gear, 51 of passive fishing gear and 45 common to both capture methods (Table 2). Among the species captured *Mylesinus paucisquamatus*, *Melanorivulus litteratus* and *Paratrygon aiereba* are considered threatened according to MMA (2014). Non-native species were not captured.

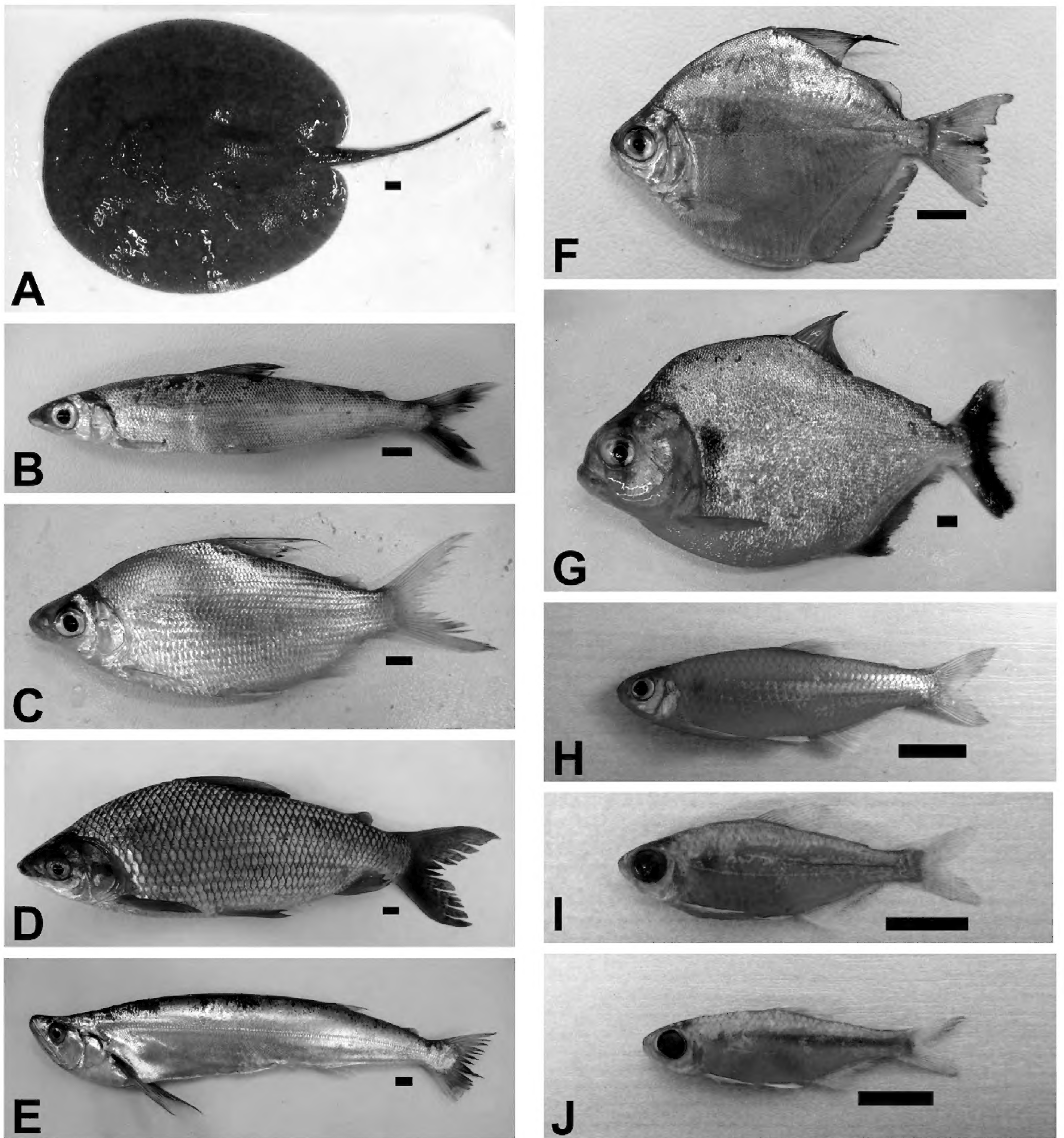
DISCUSSION

The ichthyofauna in this study shows a similar composition with that recorded from the Amazon basin. This is expected because the Tocantins River is one of the main tributaries of the lower Amazon (ROSSETTI & VALERIANO 2007). In this study, 194 species were recorded. This number corresponds to approximately 40% of 520 species estimated for the Tocantins basin (LIMA & CAIRES 2011). A previous study in the upper-

Table 1. Watercourse, municipality and geographical coordinates (altitude and longitude) from the sampling sites in the upper-middle Tocantins river basin, Tocantins state, Brazil.

Code	Sampling sites	Municipality	Geographic coordinates	
			Latitude (S)	Longitude (W)
BR	Bacabinha river	Porto Nacional	10°41'22.1"	48°33'11.1"
BS	Birimbau stream	Ipueiras	11°08'38.5"	48°28'06.96"
CS	Cabaré stream	Porto Nacional	10°49'2.93"	48°21'49.21"
DR	Domingos river	Ipueiras	11°03'39"	48°25'37.3"
ES	Engenho stream	Porto Nacional	10°38'51.72"	48°23'25.98"
FS	Francisquinha stream	Porto Nacional	10°40'05.52"	48°23'52.91"
IS01	Inferno stream 01	Ponte Alta do Bom Jesus	11°55'32.8"	46°15'46.5"
IS02	Inferno stream 02	Ponte Alta do Bom Jesus	11°55'38"	46°17'51.1"
IS03	Inferno stream 03	Ponte Alta do Bom Jesus	11°55'45.4"	46°19'31.9"
LS	Laje stream	Porto Nacional	10°44'54.56"	48°23'47.25"
MS	Manbuca stream	Monte do Carmo	11°02'52.9"	48°05'27.8"
MAR	Manoel Alves river	São Valério da Natividade	11°18'51"	48°27'16"
MAS	Matança stream	Porto Nacional	10°33'42.6"	48°32'12.7"
PS	Pecuária stream	Porto Nacional	10°38'54.9"	48°17'52.5"
RAS	Ranheta stream	Porto Nacional	10°45'53.74"	48°23'17.43"
ROS	Rosário stream	Tocantinia	10°48'39.2"	48°06'58"
SFR	São Francisco river	Ipueiras	10°58'56.7"	48°25'25.7"
SR	Surubim river	Santa Rosa do Tocantins	11°15'42"	48°26'56"
TS	Titira stream	Porto Nacional	10°49'09"	48°36'42.5"
TR1	Tocantins river (Brejinho 1)	Ipueiras	10°58'17.95"	48°31'04.4"
TR2	Tocantins river (Brejinho ou Brejinho 2)	Ipueiras	10°58'39.31"	48°31'34.53"
TR3	Tocantins river (Lajeado)	Miracema do Tocantins	09°47'15.54"	48°22'4.99"
TR4	Tocantins river (Sucupira ou Sta Luzia 2)	Palmas	10°05'42.51"	48°22'21.76"
TR5	Tocantins river (Canela)	Porto Nacional	10°14'45.8"	48°25'10.3"
TR6	Tocantins river (Córrego Alegre)	Porto Nacional	10°28'22.2"	48°25'44.4"
TR7	Tocantins river (Carmo)	Porto Nacional	10°35'50.8"	48°24'21.7"
TR8	Tocantins river (Sta Luzia 1)	Porto Nacional	10°4'10.9"	48°22'55.7"
TRD01	Tocantins river Downstream 01	Miracema do Tocantins	09°43'41.6"	48°21'33.9"
TRD02	Tocantins river Downstream 02	Miracema do Tocantins	09°45'5.1"	48°21'53.0"
TRD03	Tocantins river Downstream 03	Miracema do Tocantins	09°42'5.3"	48°21'56.8"
US	Unnamed stream	Ipueiras	11°15'20.7"	48°24'42.1"



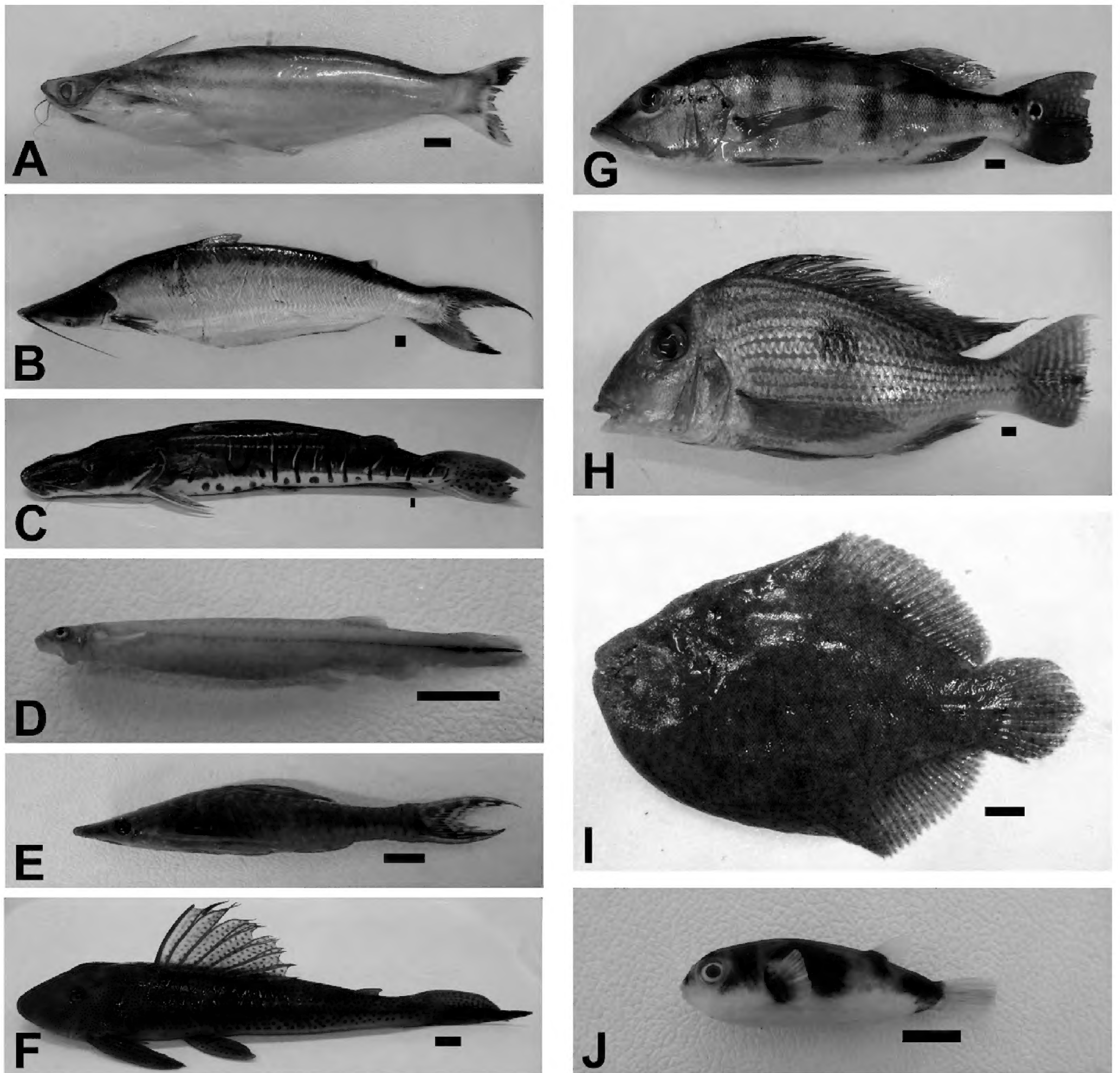


**Figure 2.** Fishes Species in the influence area of the Lajeado reservoir (upper-middle Tocantins river basin, Tocantins state, Brazil). (A) *Paratrygon aiereba*; (B) *Argonectes robertsi*; (C) *Psectrogaster amazônica*; (D) *Prochilodus nigricans*; (E) *Rhamphodon vulpinus*; (F) *Metynnis hypsauchen*; (G) *Serrasalmus eigenmanni*; (H) *Knodus* sp. 1; (I) *Moenkhausia* sp. 2; (J) *Moenkhausia* sp. 1. Scale bar = 1 cm.

middle Tocantins River found 343 species in the Lajeado reservoir (LUCINDA et al. 2007). In the upper Tocantins River 288 species were recorded in the Peixe Angical HPP area (SOARES et al. 2009) and 230 species in the area of influence of Serra da Mesa dam (BARTOLETTE et al. 2012). In the lower Tocantins River 217 species were recorded in the Tucuruí HPP region (SANTOS et al. 2004). The highest number of species recorded in these studies is associated with a larger number of sample sites and longer periods of study. Probably the number of spe-

cies in the upper-middle Tocantins River will increase when new expeditions occur in other environments not yet sampled (e.g., headwater streams and floodplains). There are species [e.g., *Phractocephalus hemiliopterus* (Bloch & Schneider, 1801); *Cetopsis* spp.; *Arapaima gigas* (Schinz, 1822); *Electrophorus electricus* (Linnaeus, 1766)] reported from riverine that have not been collected, possibly because they require specific fishing gear.

The most representative orders were Characiformes and



**Figure 3.** Fishes Species in the influence area of the Lajeado reservoir (upper-middle Tocantins river basin, Tocantins state, Brazil). (A) *Auchenipterus nuchalis*; (B) *Hypophthalmus marginatus*; (C) *Pseudoplatystoma fasciatum*; (D) *Homodiaetus* sp.; (E) *Hypoptopoma gulare*; (F) *Squaliforma emarginata*; (G) *Cichla piquiti*; (H) *Geophagus sveni*; (I) *Hypoclinemus mentalis*; (J) *Colomesus asellus*. Scale bar = 1 cm.

Siluriformes, as observed elsewhere in the Tocantins river basin and other Neotropical drainages (LOWE-McCONNELL 1999). The predominance of Characidae and Loricariidae observed in this study is consistent with the general pattern found by other authors for the Neotropical Region (REIS et al. 2003, BUCKUP et al. 2007). Despite the large number of sampled species, some families previously recorded from the Tocantins River were not collected in this study. Examples are Alestidae, Apteronotidae, Arapaimidae, Aspredinidae, Cetopsidae, Clupeidae, Gasteropelecidae and Synbranchidae. The absence of these and other families from the present study could be associated with a decline of their populations, which reinforces the need for conservation (LIMA & RIBEIRO 2011).

The use of different fishing methods in this study ensured a

representative sample of local richness, and enabled sampling in different types of habitats. Results show that the exclusive use of active fishing gear was responsible for the capture of approximately half of the recorded species and was especially effective for the small-bodied ones. Therefore, the importance of using different fishing gear is evident for a better characterization of the ichthyofauna (UIEDA & CASTRO 1999).

The Tocantins River has suffered from anthropic impacts, such as expanding agriculture and cattle ranching, as well as impoundment behind hydroelectric plants. The fragility of this river's habitats and the life history characters (e.g. migratory habits, short life cycle, viviparity) of some species of fishes make them vulnerable to anthropic impacts, and 3 species are listed in the Brazilian endangered species list (MMA 2014).



**Table 2.** List of fish species, with voucher specimens, collected in the influence area of the Lajeado reservoir (upper-middle Tocantins river basin), Tocantins state, Brazil. <sup>1</sup>species captured with active fishing gears, <sup>2</sup> species captured with passive fishing gears, and <sup>1,2</sup> species captured using both methods.

Species	Voucher	Geographical Coordinates		Distribution
		Latitude (S)	Longitude (W)	
Order Myliobatiformes				
Potamotrygonidae				
<i>Paratrygon aiereba</i> (Müller & Henle, 1841) <sup>1</sup>	2186	10°58'39.31"	48°31'34.53"	TR2
<i>Potamotrygon motoro</i> (Müller & Henle, 1841) <sup>2</sup>	1970	10°58'39.31"	48°31'34.53"	TR2
	2018	11°18'51"	48°27'16"	MAR
	1597	10°58'39.31"	48°31'34.53"	TR2
<i>Potamotrygon orbigny</i> (Castelnau, 1855) <sup>2</sup>	1599	11°15'42"	48°26'56"	SR
	2089	11°15'42"	48°26'56"	SR
<i>Potamotrygon</i> sp. 1 <sup>2</sup>	1596	10°4'10.9"	48°22'55.7"	TR8
<i>Potamotrygon</i> sp. 2 <sup>2</sup>	1595	10°05'42.51"	48°22'21.76"	TR4
<i>Potamotrygon</i> sp. 3 <sup>1</sup>	2188	10°58'17.95"	48°31'04.4"	TR1
Order Clupeiformes				
Engraulidae				
<i>Anchoviella</i> sp. 1 <sup>1</sup>	795	09°45'5.1"	48°21'53.0"	TRD02
	796	09°43'41.6"	48°21'33.9"	TRD01
<i>Anchoviella</i> sp. 2 <sup>1</sup>	788	09°45'5.1"	48°21'53.0"	TRD02
<i>Anchoviella</i> sp. 3 <sup>1</sup>	755	09°43'41.6"	48°21'33.9"	TRD01
<i>Lycengraulis batesii</i> (Günther, 1868) <sup>2</sup>	1228	10°14'45.8"	48°25'10.3"	TR5
	1884	10°05'42.51"	48°22'21.76"	TR4
Pristigasteridae				
<i>Pellona flavipinnis</i> (Valenciennes, 1837) <sup>2</sup>	2555	10°58'17.95"	48°31'04.4"	TR1
<i>Pristigaster cayana</i> Cuvier, 1829 <sup>2</sup>	1176	10°35'50.8"	48°24'21.7"	TR7
Order Characiformes				
Hemiodontidae				
<i>Anodus elongatus</i> Agassiz, 1829 <sup>1</sup>	2070	10°35'50.8"	48°24'21.7"	TR7
<i>Argonectes robertsi</i> (Langeani, 1999) <sup>1,2</sup>	758	09°43'41.6"	48°21'33.9"	TDR01
	765	09°45'5.1"	48°21'53.0"	TDR02
	1235	10°14'45.8"	48°25'10.3"	TR5
<i>Bivibranchia bimaculata</i> Vari, 1985 <sup>1</sup>	1958	10°14'45.8"	48°25'10.3"	TR5
	2071	10°28'22.2"	48°25'44.4"	TR6
<i>Hemiodus microlepis</i> Kner, 1858 <sup>2</sup>	1248	10°58'39.31"	48°31'34.53"	TR2
	2069	10°28'22.2"	48°25'44.4"	TR6
<i>Hemiodus ternetzi</i> Myers, 1927 <sup>1</sup>	1396	11°55'45.4"	46°19'31.9"	IS03
	1413	11°55'38"	46°17'51.1"	IS02
	2094	11°15'42"	48°26'56"	SR
<i>Hemiodus unimaculatus</i> (Bloch, 1794) <sup>1,2</sup>	731	09°45'5.1"	48°21'53.0"	TRD02
	1443	10°58'39.31"	48°31'34.53"	TR2
	2077	10°58'39.31"	48°31'34.53"	TR2
Parodontidae				
<i>Apareiodon machrisi</i> Travassos, 1957 <sup>1</sup>	1510	10°35'50.8"	48°24'21.7"	TR7
<i>Apareiodon</i> sp. <sup>1</sup>	1892	10°33'42.6"	48°32'12.7"	MTS
Curimatidae				
<i>Curimata acutirostris</i> Vari & Reis, 1995 <sup>2</sup>	805	09°45'5.1"	48°21'53.0"	TDR02
	1867	11°18'51"	48°27'16"	MAR
<i>Curimata inornata</i> Vari, 1989 <sup>2</sup>	1158	10°35'50.8"	48°24'21.7"	TR7
	2185	10°35'50.8"	48°24'21.7"	TR7
	1866	11°18'51"	48°27'16"	MAR
<i>Curimatella dorsalis</i> (Eigenmann & Eigenmann, 1889) <sup>1,2</sup>	1210	09°47'15.54"	48°22'4.99"	TR3
	1959	10°14'45.8"	48°25'10.3"	TR5
<i>Cyphocharax spiluroopsis</i> (Eigenmann & Eigenmann, 1889) <sup>1,2</sup>	1417	11°55'38"	46°17'51.1"	IS02
	1492	10°49'09"	48°36'42.5"	TS
	1512	10°35'50.8"	48°24'21.7"	TR7
<i>Psectrogaster amazonica</i> Eigenmann & Eigenmann, 1889 <sup>2</sup>	1187	10°14'45.8"	48°25'10.3"	TR5
<i>Steindachnerina amazonica</i> (Steindachner, 1911) <sup>1</sup>	1496	10°49'09"	48°36'42.5"	TS
	1949	10°58'39.31"	48°31'34.53"	TR2
	1960	10°14'45.8"	48°25'10.3"	TR5
Prochilodontidae				
<i>Prochilodus nigricans</i> Spix & Agassiz, 1829 <sup>1,2</sup>	753	09°45'5.1"	48°21'53.0"	TDR02
	1247	10°28'22.2"	48°25'44.4"	TR6
	1936	11°15'42"	48°26'56"	SR
Anostomidae				
<i>Laemolyta fernandezi</i> Myers, 1950 <sup>2</sup>	736	09°45'5.1"	48°21'53.0"	TDR02
	742	09°43'41.6"	48°21'33.9"	TDR01
<i>Leporellus vitattus</i> Valenciennes, 1850 <sup>2</sup>	754	09°43'41.6"	48°21'33.9"	TDR01

Continued

Table 2. Continued.

Species	Voucher	Geographical Coordinates		Distribution
		Latitude (S)	Longitude (W)	
<i>Leporinus affinis</i> Günther, 1864 <sup>2</sup>	737	09°43'41.6"	48°21'33.9"	TDR01
	1184	10°58'39.31"	48°31'34.53"	TR2
	1394	11°55'45.4"	46°19'31.9"	ISO3
<i>Leporinus bistratus</i> Britski, 1997 <sup>1</sup>	1397	11°55'45.4"	46°19'31.9"	ISO3
<i>Leporinus desmotes</i> Fowler, 1914 <sup>2</sup>	1162	10°28'22.2"	48°25'44.4"	TR6
<i>Leporinus friderici</i> (Bloch, 1794) <sup>2</sup>	746	09°43'41.6"	48°21'33.9"	TDR01
	1192	09°47'15.54"	48°22'4.99"	TR3
	1392	11°55'45.4"	46°19'31.9"	ISO3
<i>Leporinus</i> sp. cf. <i>L. ortomaculatus</i> Garavello, 2000 <sup>1</sup>	1412	11°55'38"	46°17'51.1"	ISO2
	1422	11°55'32.8"	46°15'46.5"	ISO1
	757	09°43'41.6"	48°21'33.9"	TDR01
<i>Leporinus</i> sp. <sup>2</sup>	1393	11°55'45.4"	46°19'31.9"	ISO3
	1934	11°15'42"	48°26'56"	SR
	1460	10°14'45.8"	48°25'10.3"	TR5
<i>Leporinus taeniatus</i> Lütken, 1875 <sup>1,2</sup>	1882	10°05'42.51"	48°22'21.76"	TR4
	2165	10°05'42.51"	48°22'21.76"	TR4
	1954	10°14'45.8"	48°25'10.3"	TR5
<i>Leporinus taeniofasciatus</i> Britski, 1997 <sup>2</sup>	734	09°43'41.6"	48°21'33.9"	TDR01
<i>Leporinus tigrinus</i> Borodin, 1929 <sup>2</sup>		10°58'39.31"	48°31'34.53"	TR2
<i>Schizodon vittatus</i> (Valenciennes, 1850) <sup>2</sup>		10°14'45.8"	48°25'10.3"	TR5
Chilodontidae				
<i>Caenotropus labyrinthicus</i> (Kner, 1858) <sup>1,2</sup>	770	09°43'41.6"	48°21'33.9"	TDR01
	1203	10°35'50.8"	48°24'21.7"	TR7
	2075	10°58'39.31"	48°31'34.53"	TR2
<i>Caenotropus</i> sp. <sup>1,2</sup>	820	09°45'5.1"	48°21'53.0"	TDR02
	1440	10°58'39.31"	48°31'34.53"	TR2
	1935	11°15'42"	48°26'56"	SR
Erythrinidae				
<i>Hoplerythrinus unitaeniatus</i> (Spix & Agassiz, 1829) <sup>1</sup>	2061	10°58'56.7"	48°25'25.7"	SFR
<i>Hoplias curupira</i> Oyakawa & Mattox, 2009 <sup>1</sup>	1411	11°55'38"	46°17'51.1"	ISO2
	1497	10°49'09"	48°36'42.5"	TS
	1241	10°44'54.56"	48°23'47.25"	LS
<i>Hoplias malabaricus</i> (Bloch, 1794) <sup>1,2</sup>	2093	11°15'42"	48°26'56"	SR
	2363	11°08'38.5"	48°28'06.96"	BS
Lebiasinidae				
Pyrrhuliinae				
<i>Pyrrhulina brevis</i> Steindachner, 1876 <sup>1</sup>	1327	10°49'2.93"	48°21'49.21"	CS
	2062	10°58'56.7"	48°25'25.7"	SFR
	2113	11°08'38.5"	48°28'06.96"	BS
Ctenoluciidae				
<i>Boulengerella cuvieri</i> (Spix & Agassiz, 1829) <sup>1,2</sup>	2091	11°15'42"	48°26'56"	SR
	2187	10°58'17.95"	48°31'04.4"	TR1
Acestrorhynchidae				
Acestrorhynchinae				
<i>Acestrorhynchus falcatus</i> (Bloch, 1794) <sup>1,2</sup>	1498	10°49'09"	48°36'42.5"	TS
	1508	10°35'50.8"	48°24'21.7"	TR7
	2102	10°33'42.6"	48°32'12.7"	MS
<i>Acestrorhynchus microlepis</i> (Jardine, 1841) <sup>1,2</sup>	1170	10°14'45.8"	48°25'10.3"	TR5
	1442	10°58'39.31"	48°31'34.53"	TR2
Cynodontidae				
Cynodontinae				
<i>Cynodon gibbus</i> (Agassiz, 1829) <sup>2</sup>	2182	10°58'17.95"	48°31'04.4"	TR1
<i>Hydrolycus armatus</i> (Jardine, 1841) <sup>2</sup>		09°43'41.6"	48°21'33.9"	TRD01
<i>Rhaphiodon vulpinus</i> Spix & Agassiz, 1829 <sup>1,2</sup>	803	09°45'5.1"	48°21'53.0"	TDR02
	1237	10°28'22.2"	48°25'44.4"	TR6
Serrasalminae				
<i>Acnodon normani</i> Gosline, 1951 <sup>1,2</sup>	1160	10°35'50.8"	48°24'21.7"	TR7
	1466	10°14'45.8"	48°25'10.3"	TR5
	1202	10°28'22.2"	48°25'44.4"	TR6
<i>Metynnis hypsauchen</i> (Müller & Troschel, 1844) <sup>1,2</sup>	1366	09°47'15.54"	48°22'4.99"	TR3
	2085	10°05'42.51"	48°22'21.76"	TR4
	1946	10°58'39.31"	48°31'34.53"	TR2
<i>Metynnis</i> sp. <sup>1,2</sup>	1405	11°55'45.4"	46°19'31.9"	ISO3
<i>Mylesinus paucisquamatus</i> Jégu & Santos, 1988 <sup>1,2</sup>	1418	11°55'32.8"	46°15'46.5"	ISO1
	2183	(10°05'42.51"	48°22'21.76"	TR4
<i>Myleus setiger</i> Müller & Troschel, 1844 <sup>1</sup>				

Continued

Table 2. Continued.

Species	Voucher	Geographical Coordinates		Distribution
		Latitude (S)	Longitude (W)	
<i>Myleus torquatus</i> (Kner, 1858) <sup>2</sup>	763	09°43'41.6"	48°21'33.9"	TDR01
	1306	10°40'05.52"	48°23'52.91"	FS
	1414	11°55'38"	46°17'51.1"	IS02
<i>Myloplus rubripinnis</i> (Müller & Troschel, 1844) <sup>1</sup>	1165	09°47'15.54"	48°22'4.99"	TR3
	2166	10°05'42.51"	48°22'21.76"	TR4
<i>Serrasalmus eigenmanni</i> Norman, 1929 <sup>2</sup>	1201	10°14'45.8"	48°25'10.3"	TR5
	1877	11°15'42"	48°26'56"	SR
	1969	09°47'15.54"	48°22'4.99"	TR3
<i>Serrasalmus maculatus</i> Kner, 1858 <sup>1,2</sup>	1198	10°05'42.51"	48°22'21.76"	TR4
	1215	09°47'15.54"	48°22'4.99"	TR3
<i>Serrasalmus rhombeus</i> (Linnaeus, 1766) <sup>2</sup>	1874	10°14'45.8"	48°25'10.3"	TR5
Characidae				
Stethaprioninae				
<i>Poptella compressa</i> (Günther, 1864) <sup>1</sup>	2128	11°03'39"	48°25'37.3"	DR
Aphyocharacinae				
<i>Aphyocharax dentatus</i> Eigenmann & Kennedy, 1903 <sup>1</sup>	2049	11°08'38.5"	48°28'06.96"	BS
	2095	11°15'42"	48°26'56"	SR
Characinae				
<i>Exodon paradoxus</i> Müller & Troschel, 1844 <sup>1</sup>	1458	10°14'45.8"	48°25'10.3"	TR5
	2097	11°15'42"	48°26'56"	SR
<i>Galeocharax gulo</i> Cope, 1870 <sup>1,2</sup>	771	09°45'5.1"	48°21'53.0"	TDR02
	1185	10°4'10.9"	48°22'55.7"	TR8
	1229	10°28'22.2"	48°25'44.4"	TR6
<i>Phenacogaster megalostictus</i> Eigenmann, 1909 <sup>1</sup>	1484	10°14'45.8"	48°25'10.3"	TR5
	1865	11°15'42"	48°26'56"	SR
	1899	10°58'39.31"	48°31'34.53"	TR2
<i>Roeboexodon guyanensis</i> (Puyo, 1948) <sup>1</sup>	1501	10°14'45.8"	48°25'10.3"	TR5
	1894	10°58'39.31"	48°31'34.53"	TR2
	2147	11°18'51"	48°27'16"	MAR
<i>Roeboides affinis</i> (Günther, 1868) <sup>1,2</sup>	715	09°43'41.6"	48°21'33.9"	TDR01
	1190	10°05'42.51"	48°22'21.76"	TR4
	2083	10°05'42.51"	48°22'21.76"	TR4
Tetragonopterinae				
<i>Tetragonopterus argenteus</i> Cuvier, 1816 <sup>12</sup>	1436	10°33'42.6"	48°32'12.7"	MTS
	1455	11°15'42"	48°26'56"	SR
<i>Tetragonopterus chalceus</i> (Spix & Agassiz, 1829) <sup>12</sup>	747	09°45'5.1"	48°21'53.0"	TDR02
	1217	10°05'42.51"	48°22'21.76"	TR\$
	1873	11°15'42"	48°26'56"	SR
<i>Tetragonopterus</i> sp. <sup>1</sup>	1216	09°47'15.54"	48°22'4.99"	TR3
Cheirodontinae				
<i>Serrapinnus lucindai</i> Jerep & Malabarba, 2014 <sup>1</sup>	1298	10°44'54.56"	48°23'47.25"	LS
	1509	10°35'50.8"	48°24'21.7"	TR7
	1976	10°14'45.8"	48°25'10.3"	TR5
<i>Serrapinnus sterbai</i> Zarske, 2012 <sup>1</sup>	1593	10°33'42.6"	48°32'12.7"	MTS
Jupiaba clade				
<i>Jupiaba citrina</i> Zanata & Ohara, 2009 <sup>1</sup>	1297	10°44'54.56"	48°23'47.25"	LS
	1312	10°38'51.72"	48°23'25.98"	ES
<i>Jupiaba elassonaktis</i> (Pereira & Lucinda, 2007) <sup>1</sup>	750	09°43'41.6"	48°21'33.9"	TDR01
	1357	10°58'39.31"	48°31'34.53"	TR4
	1897	10°58'39.31"	48°31'34.53"	TR2
Pristellinae				
<i>Hemigrammus ataktos</i> Marinho, Dagosta & Birindelli, 2014 <sup>1</sup>	1363	09°47'15.54"	48°22'4.99"	TR3
	1371	10°14'45.8"	48°25'10.3"	TR5
<i>Hemigrammus ora</i> Zarske, Le Bail & Géry, 2006 <sup>1</sup>	1314	10°38'51.72"	48°23'25.98"	ES
	1505	10°49'09"	48°36'42.5"	TS
<i>Hemigrammus</i> sp., cf. <i>H. geisleri</i> <sup>1</sup>	1925	11°15'42"	48°26'56"	SR
<i>Hemigrammus</i> sp. <sup>1</sup>	1944	10°58'39.31"	48°31'34.53"	TR2
<i>Hyphessobrycon heterorhabdus</i> (Ulrey, 1894) <sup>1</sup>	1855	11°15'42"	48°26'56"	SR
<i>Hyphessobrycon</i> sp. <sup>1</sup>	773	09°45'5.1"	48°21'53.0"	TDR2
	1324	10°45'53.74"	48°23'17.43"	RAS
	1974	11°15'42"	48°26'56"	SR
<i>Hyphessobrycon stegemanni</i> Géry, 1961 <sup>1</sup>	723	09°43'41.6"	48°21'33.9"	TDR01
	1459	11°18'51"	48°27'16"	MAR
	1951	10°35'50.8"	48°24'21.7"	TR7
<i>Moenkhausia chrysargyrea</i> (Günther, 1864) <sup>1</sup>	1233	09°47'15.54"	48°22'4.99"	TR3
	1893	10°58'39.31"	48°31'34.53"	TR2

Continued



Table 2. Continued.

Species	Voucher	Geographical Coordinates		Distribution
		Latitude (S)	Longitude (W)	
<i>Moenkhausia dichroua</i> (Kner, 1858) <sup>1</sup>	1464	10°14'45.8"	48°25'10.3"	TR5
	1953	10°14'45.8"	48°25'10.3"	TR5
	2081	10°58'39.31"	48°31'34.53"	TR4
<i>Moenkhausia grandisquamis</i> (Müller & Troschel, 1845) <sup>1</sup>	1947	10°58'39.31"	48°31'34.53"	TR2
<i>Moenkhausia hysterostricta</i> Lucinda, Malabarba & Benine, 2007 <sup>1</sup>	1225	10°28'22.2"	48°25'44.4"	TR6
	1485	10°14'45.8"	48°25'10.3"	TR5
	2164	10°58'39.31"	48°31'34.53"	TR4
<i>Moenkhausia jamesi</i> Eigenmann, 1908 <sup>1</sup>	1148	10°35'50.8"	48°24'21.7"	TR7
<i>Moenkhausia mikia</i> Marinho & Langeani, 2010 <sup>1</sup>	1864	11°15'42"	48°26'56"	SR
	1890	11°18'51"	48°27'16"	MAR
<i>Moenkhausia oligolepis</i> (Günther, 1864) <sup>1</sup>	1309	10°38'51.72"	48°23'25.98"	ES
	1587	10°33'42.6"	48°32'12.7"	MTS
	2103	10°33'42.6"	48°32'12.7"	MTS
<i>Moenkhausia</i> sp. 1 <sup>1</sup>	1927	11°15'42"	48°26'56"	SR
	1941	10°58'39.31"	48°31'34.53"	TR2
<i>Moenkhausia</i> sp. 2 <sup>1</sup>	1928	11°15'42"	48°26'56"	SR
	1942	10°58'39.31"	48°31'34.53"	TTR2
<i>Moenkhausia</i> sp. 3 <sup>1</sup>	1856	11°15'42"	48°26'56"	SR
	1898	10°58'39.31"	48°31'34.53"	TR2
	1965	10°14'45.8"	48°25'10.3"	TR5
<i>Moenkhausia</i> sp., cf. <i>M. collettii</i> (Steindachner, 1882) <sup>1</sup>	1313	10°38'51.72"	48°23'25.98"	ES
	1325	10°49'2.93"	48°21'49.21"	CS
	1482	11°18'51"	48°27'16"	MAR
<i>Moenkhausia</i> sp., cf. <i>M. jamesi</i> Eigenmann, 1908 <sup>1</sup>	1964	10°14'45.8"	48°25'10.3"	TR5
<i>Moenkhausia</i> sp., cf. <i>M. lepidura</i> (Kner, 1858) <sup>1</sup>	1449	10°58'39.31"	48°31'34.53"	TR2
	1463	10°58'39.31"	48°31'34.53"	TR2
	1861	11°15'42"	48°26'56"	SR
Astyanax clade				
<i>Astyanax elachylepis</i> Bertaco & Lucinda, 2005 <sup>1</sup>	2056	10°48'39.2"	48°06'58"	ROS
	2109	11°02'52.9"	48°05'27.8"	MS
<i>Astyanax goyacensis</i> Eigenmann, 1908 <sup>1</sup>	776	09°43'41.6"	48°21'33.9"	TDR01
	1590	11°02'52.9"	48°05'27.8"	MS
	2110	10°33'42.6"	48°32'12.7"	MAS
<i>Astyanax goyanensis</i> (Miranda Ribeiro, 1944) <sup>1</sup>	1879	11°15'42"	48°26'56"	SR
<i>Ctenobrycon hauxwellianus</i> (Cope, 1870) <sup>1</sup>	1365	09°47'15.54"	48°22'4.99"	TR3
	2050	11°15'20.7"	48°24'42.1"	US
Aphyoditeinae				
<i>Microschemobrycon casiquiare</i> Böhlke, 1953 <sup>1</sup>	1483	10°14'45.8"	48°25'10.3"	TR5
	1924	11°15'42"	48°26'56"	SR
	1945	10°58'39.31"	48°31'34.53"	TR2
Stevardiinae				
<i>Creagrus britskii</i> Vari & Harold, 2001 <sup>1</sup>	712	09°43'41.6"	48°21'33.9"	TDR01
	1506	10°35'50.8"	48°24'21.7"	TR7
	1591	11°02'52.9"	48°05'27.8"	MS
<i>Creagrus cracentis</i> Vari & Harold, 2001 <sup>1</sup>	1358	10°05'42.51"	48°22'21.76"	TR4
	1465	10°14'45.8"	48°25'10.3"	TR5
<i>Creagrus</i> sp. 1 <sup>1</sup>	782	09°45'5.1"	48°21'53.0"	TDR02
	1887	10°49'09"	48°36'42.5"	TS
	1973	11°15'42"	48°26'56"	SR
<i>Knodus chapadae</i> (Fowler, 1906) <sup>1</sup>	1402	11°55'45.4"	46°19'31.9"	IS03
	1420	11°55'32.8"	46°15'46.5"	IS01
<i>Knodus savannensis</i> Géry, 1961 <sup>1</sup>	1406	11°55'45.4"	46°19'31.9"	IS03
	1423	11°55'32.8"	46°15'46.5"	IS01
	1481	11°18'51"	48°27'16"	MAR
<i>Knodus</i> sp. 1 <sup>1</sup>	707	09°43'41.6"	48°21'33.9"	TDR01
	1304	10°40'05.52"	48°23'52.91"	FS
	1895	10°58'39.31"	48°31'34.53"	TR2
<i>Knodus</i> sp., cf. <i>K. chapadae</i> (Fowler, 1906) <sup>1</sup>	1401	11°55'45.4"	46°19'31.9"	IS03
	1502	10°49'09"	48°36'42.5"	TS
<i>Knodus</i> sp., cf. <i>K. shinahota</i> Ferreira & Carvajal, 2007 <sup>1</sup>	708	09°43'41.6"	48°21'33.9"	TDR01
	1370	10°14'45.8"	48°25'10.3"	TR5
	1963	10°14'45.8"	48°25'10.3"	TR5
<i>Knodus</i> spp. <sup>1</sup>	1487	10°14'45.8"	48°25'10.3"	TR5
	1592	10°48'39.2"	48°06'58"	ROS
	2054	10°33'42.6"	48°32'12.7"	MAS

Continued

Table 2. Continued.

Species	Voucher	Geographical Coordinates		Distribution
		Latitude (S)	Longitude (W)	
Bryconidae				
Bryconinae				
<i>Brycon pesu</i> Müller & Troschel, 1845 <sup>1</sup>	1156	09°47'15.54"	48°22'4.99"	TR3
	1359	09°47'15.54"	48°22'4.99"	TR3
<i>Brycon</i> sp. <sup>1</sup>	2188	10°58'17.95"	48°31'04.4"	TR1
Salmininae				
<i>Salminus hilarii</i> Valenciennes, 1850 <sup>1,2</sup>	1150	10°35'50.8"	48°24'21.7"	TR7
	2076	10°58'39.31"	48°31'34.53"	TR2
	2179	10°58'17.95"	48°31'04.4"	TR1
Triportheidae				
Triportheinae				
<i>Triportheus albus</i> Cope, 1872 <sup>1,2</sup>	1178	10°58'17.95"	48°31'04.4"	TR1
	1204	10°35'50.8"	48°24'21.7"	TR7
	1952	10°14'45.8"	48°25'10.3"	TR5
Iguanodectidae				
Bryconops Clade				
<i>Bryconops alburnoides</i> Kner, 1858 <sup>1,2</sup>	1155	10°14'45.8"	48°25'10.3"	TR5
	1479	11°18'51"	48°27'16"	MAR
	1320	10°45'53.74"	48°23'17.43"	RAS
<i>Bryconops caudomaculatus</i> (Günther, 1864) <sup>1</sup>	1513	10°35'50.8"	48°24'21.7"	TR7
	2122	10°38'54.9"	48°17'52.5"	OS
	2142	11°03'39"	48°25'37.3"	DR
<i>Bryconops melanurus</i> (Bloch, 1794) <sup>1</sup>	702	09°45'5.1"	48°21'53.0"	TDR02
	790	09°45'5.1"	48°21'53.0"	TDR02
	1310	10°38'51.72"	48°23'25.98"	ES
<i>Bryconops</i> sp., cf. <i>B. caudomaculatus</i> (Günther, 1864) <sup>1</sup>	1398	11°55'45.4"	46°19'31.9"	IS03
	1409	11°55'38"	46°17'51.1"	IS02
	1419	11°55'32.8"	46°15'46.5"	IS01
Crenuchidae				
Characidiinae				
<i>Characidium</i> sp. <sup>1</sup>	1586	10°33'42.6"	48°32'12.7"	MAS
	2051	11°15'20.7"	48°24'42.1"	US
	2125	11°18'51"	48°27'16"	MAR
Order Siluriformes				
Doradidae				
<i>Oxydoras niger</i> (Valenciennes, 1821) <sup>2</sup>	818	09°45'5.1"	48°21'53.0"	TDR02
<i>Platydoras costatus</i> (Linnaeus, 1758) <sup>2</sup>	1876	11°15'42"	48°26'56"	SR
<i>Pterodoras granulosus</i> (Valenciennes, 1821) <sup>2</sup>		10°14'45.8"	48°25'10.3"	TR5
Doradinae				
<i>Hassar wilderi</i> (Kindle, 1895) <sup>1,2</sup>	767	09°45'5.1"	48°21'53.0"	TDR02
	804	09°45'5.1"	48°21'53.0"	TDR02
Auchenipteridae				
Auchenipterinae				
<i>Ageneiosus inermis</i> (Linnaeus, 1766) <sup>2</sup>	1246	09°47'15.54"	48°22'4.99"	TR3
	1966	11°18'51"	48°27'16"	MAR
	1240	10°58'17.95"	48°31'04.4"	TR1
<i>Ageneiosus ucayalensis</i> Castelnau, 1855 <sup>2</sup>	1194	10°35'50.8"	48°24'21.7"	TR7
<i>Auchenipterus nuchalis</i> (Spix & Agassiz, 1829) <sup>1,2</sup>	1153	10°35'50.8"	48°24'21.7"	TR7
	1878	11°15'42"	48°26'56"	SR
	2157	10°48'39.2"	48°06'58"	ROS
<i>Tocantinsia piresi</i> (Miranda Ribeiro, 1920) <sup>2</sup>	1249	10°58'39.31"	48°31'34.53"	TR2
Pimelodidae				
<i>Hemisorubim platyrhynchos</i> Valenciennes, 1840 <sup>2</sup>	2171	11°18'51"	48°27'16"	MAR
<i>Hypophthalmus marginatus</i> Valenciennes, 1840 <sup>2</sup>		10°58'39.31"	48°31'34.53"	TR2
		10°14'45.8"	48°25'10.3"	TR5
		11°18'51"	48°27'16"	MAR
<i>Pimelodina flavipinnis</i> Steindachner, 1876 <sup>2</sup>	1251	10°35'50.8"	48°24'21.7"	TR7
<i>Pimelodus blochii</i> Valenciennes, 1840 <sup>2</sup>	745	11°15'42"	48°26'56"	TR3
	1869	11°15'42"	48°26'56"	SR
<i>Pimelodus ornatus</i> Kner, 1858 <sup>1,2</sup>	1186	10°28'22.2"	48°25'44.4"	TR6
	1452	10°58'39.31"	48°31'34.53"	TR2
<i>Pimelodus stewarti</i> Ribeiro, Lucena & Lucinda, 2008 <sup>1,2</sup>	739	09°45'5.1"	48°21'53.0"	TDR02
	1223	10°35'50.8"	48°24'21.7"	TR7
	2172	11°15'42"	48°26'56"	SR
<i>Pimelodus tetramerus</i> Ribeiro & Lucena, 2006 <sup>1,2</sup>	1222	10°35'50.8"	48°24'21.7"	TR7
	1600	10°05'42.51"	48°22'21.76"	TR4
	1601	11°15'42"	48°26'56"	TR3

Continued

Table 2. Continued.

Species	Voucher	Geographical Coordinates		Distribution
		Latitude (S)	Longitude (W)	
<i>Pinirampus pinirampu</i> (Spix & Agassiz, 1829) <sup>2</sup>		11°18'51"	48°27'16"	MAR
<i>Pseudoplatystoma fasciatum</i> (Linnaeus, 1766) <sup>2</sup>	819	09°43'41.6"	48°21'33.9"	TDR01
	2169	11°15'42"	48°26'56"	SR
<i>Sorubim lima</i> (Bloch & Schneider, 1801) <sup>2</sup>	1938	11°15'20.7"	48°24'42.1"	US
	1967	11°15'42"	48°26'56"	SR
<i>Zungaro zungaro</i> (Humboldt, 1821) <sup>2</sup>	2170	11°18'51"	48°27'16"	MAR
Pseudopimelodidae				
<i>Pseudopimelodus bufonius</i> (Valenciennes, 1840) <sup>2</sup>	1971	11°15'42"	48°26'56"	SR
Heptapteridae				
<i>Cetopsorhamdia</i> sp. <sup>1</sup>	2115	11°02'52.9"	48°05'27.8"	MS
<i>Phenacorhamdia</i> sp. <sup>1</sup>	1851	10°41'22.1"	48°33'11.1"	BR
	2140	11°03'39"	48°25'37.3"	DR
<i>Pimelodella cristata</i> (Müller & Troschel, 1849) <sup>1</sup>	711	09°45'5.1"	48°21'53.0"	TDR02
	1328	10°49'2.93"	48°21'49.21"	CS
	2114	11°02'52.9"	48°05'27.8"	MS
<i>Rhamdia</i> sp. <sup>1</sup>	2184	11°02'52.9"	48°05'27.8"	MS
Trichomycteridae				
Vandeliinae				
<i>Vandellia</i> sp. 1 <sup>1</sup>	2098	11°15'42"	48°26'56"	SR
<i>Vandellia</i> sp. 2 <sup>1</sup>	2123	10°58'39.31"	48°31'34.53"	TR2
	2130	10°58'39.31"	48°31'34.53"	TR2
Stegophilinae				
<i>Homodiaetus</i> sp. <sup>1</sup>	2079	10°58'39.31"	48°31'34.53"	TR2
<i>Stegophilus</i> sp. <sup>1</sup>	1939	11°15'42"	48°26'56"	SR
Callichthyidae				
Callichthyinae				
<i>Callichthys callichthys</i> (Linnaeus, 1758) <sup>2</sup>	1197	10°05'42.51"	48°22'21.76"	TR4
<i>Megalechis thoracata</i> (Valenciennes, 1840) <sup>1</sup>	1317	10°38'51.72"	48°23'25.98"	ES
Corydoradinae				
<i>Aspidoras</i> sp. cf. <i>A. poecilus</i> Nijssen & Isbrücker 1976 <sup>1</sup>	1333	10°49'2.93"	48°21'49.21"	CS
	2101	11°02'52.9"	48°05'27.8"	MS
	2120	11°08'38.5"	48°28'06.96"	BS
<i>Corydoras</i> sp. <sup>1</sup>	1931	11°15'42"	48°26'56"	SR
	2099	11°15'42"	48°26'56"	SR
	2121	11°08'38.5"	48°28'06.96"	BS
Loricariidae				
Hypoptopomatinae				
<i>Hypoptopoma gulare</i> Cope, 1878 <sup>2</sup>	2365	11°15'42"	48°26'56"	SR
<i>Otocinclus hoppei</i> Miranda Ribeiro, 1939 <sup>1</sup>	1850	10°58'39.31"	48°31'34.53"	TR2
	2100	11°15'42"	48°26'56"	SR
	2108	11°02'52.9"	48°05'27.8"	MS
Loricariinae				
<i>Harttia punctata</i> Rapp Py-Daniel & Oliveira, 2001 <sup>2</sup>	1399	11°55'45.4"	46°19'31.9"	IS03
<i>Hemiodontichthys</i> sp., cf. <i>H. acipenserinus</i> (Kner, 1853) <sup>2</sup>	1883	11°15'42"	48°26'56"	SR
<i>Loricaria</i> sp. 1 <sup>1,2</sup>	1368	11°15'42"	48°26'56"	TR3
	1871	11°15'42"	48°26'56"	TR3
<i>Loricaria</i> sp. 2 <sup>1,2</sup>	2106	11°02'52.9"	48°05'27.8"	MS
<i>Paraloricaria</i> sp. <sup>1</sup>	1167	10°35'50.8"	48°24'21.7"	TR7
	1205	10°28'22.2"	48°25'44.4"	TR6
<i>Rineloricaria lanceolata</i> (Günther, 1868) <sup>1,2</sup>	714	09°45'5.1"	48°21'53.0"	TDR02
	1175	11°18'51"	48°27'16"	TR8
	2176	11°18'51"	48°27'16"	MAR
<i>Rineloricaria</i> sp. <sup>1,2</sup>	740	09°43'41.6"	48°21'33.9"	TDR01
	1870	11°15'42"	48°26'56"	SR
	2174	11°18'51"	48°27'16"	MAR
<i>Sturisoma</i> sp. <sup>2</sup>	1875	11°15'42"	48°26'56"	SR
Hypostominae				
<i>Hypostomus</i> sp., cf. <i>H. plecostomus</i> (Linnaeus, 1758) <sup>1</sup>	2129	11°15'20.7"	48°24'42.1"	US
<i>Hypostomus</i> sp. <sup>1</sup>	1347	10°58'39.31"	48°31'34.53"	TR2
	1500	10°49'09"	48°36'42.5"	TS
<i>Pterygoplichthys joselimaianus</i> (Weber, 1991) <sup>2</sup>	1968	10°14'45.8"	48°25'10.3"	TR5
<i>Squaliforma emarginata</i> (Valenciennes, 1840) <sup>1,2</sup>	738	09°43'41.6"	48°21'33.9"	TDR01
	1305	10°40'05.52"	48°23'52.91"	FS
	2177	11°15'42"	48°26'56"	SR
Ancistrinae				
<i>Ancistrus</i> sp., cf. <i>A. minutus</i> Fisch-Muller, Mazzoni & Weber, 2001 <sup>1</sup>	718	09°43'41.6"	48°21'33.9"	TDR01

Continued



Table 2. Continued.

Species	Voucher	Geographical Coordinates		Distribution
		Latitude (S)	Longitude (W)	
<i>Ancistrus</i> sp. <sup>1</sup>	807	09°43'41.6"	48°21'33.9"	TDR01
	1499	10°49'09"	48°36'42.5"	TS
	2143	11°03'39"	48°25'37.3"	DR
<i>Baryancistrus niveatus</i> (Castelnau, 1855) <sup>2</sup>	741	09°43'41.6"	48°21'33.9"	TDR01
	817	09°45'5.1"	48°21'53.0"	TDR02
<i>Hemiancistrus</i> sp. <sup>1</sup>	808	09°45'5.1"	48°21'53.0"	TDR02
	1415	11°55'38"	46°17'51.1"	IS02
Order Gymnotiformes				
Sternopygidae				
<i>Eigenmannia</i> sp. <sup>1,2</sup>	1221	10°14'45.8"	48°25'10.3"	TR5
	1352	11°15'42"	48°26'56"	SR
	2132	10°58'39.31"	48°31'34.53"	TR2
<i>Sternopygus macrurus</i> (Bloch & Schneider, 1801) <sup>1</sup>	1852	10°41'22.1"	48°33'11.1"	BR
Rhamphichthyidae				
<i>Gymnorhamphichthys</i> sp. <sup>1</sup>	2052	11°15'20.7"	48°24'42.1"	US
	2107	11°02'52.9"	48°05'27.8"	MS
Gymnodontidae				
<i>Gymnotus carapo</i> Linnaeus, 1758 <sup>1</sup>	1329	10°49'2.93"	48°21'49.21"	CS
Order Cyprinodontiformes				
Cynolebiidae				
<i>Melanorivulus litteratus</i> (Costa, 2005) <sup>1</sup>	1330	10°49'2.93"	48°21'49.21"	CS
<i>Melanorivulus</i> sp. <sup>1</sup>	2116	11°02'52.9"	48°05'27.8"	MS
	2118	11°08'38.5"	48°28'06.96"	BS
Poeciliidae				
Poeciliinae				
<i>Pamphorichthys araguaiensis</i> Costa, 1991 <sup>1</sup>	1316	10°38'51.72"	11°15'42"	ES
	1364	48°23'25.98"	48°26'56"	TR3
Incertae sedis				
Sciaenidae				
<i>Pachypops fourcroyi</i> (Lacepède, 1802) <sup>1,2</sup>	717	09°43'41.6"	48°21'33.9"	TDR01
	1343	10°58'39.31"	48°31'34.53"	TR2
	2181	10°58'17.95"	48°31'04.4"	TR1
<i>Pachyurus junki</i> Soares & Casatti, 2000 <sup>1,2</sup>	743	09°45'5.1"	48°21'53.0"	TDR02
	1213	10°28'22.2"	48°25'44.4"	TR6
	2167	10°28'22.2"	48°25'44.4"	TR6
<i>Plagioscion squamosissimus</i> (Heckel, 1840) <sup>1,2</sup>	806	09°45'5.1"	48°21'53.0"	TDR02
	1208	10°28'22.2"	48°25'44.4"	TR6
	1230	10°35'50.8"	48°24'21.7"	TR7
Order Cichliformes				
Cichlidae				
Cichlinae				
<i>Aequidens tetramerus</i> (Heckel, 1840) <sup>1</sup>	1308	10°40'05.52"	48°23'52.91"	FS
	1493	10°49'09"	48°36'42.5"	TS
<i>Cichla piquiti</i> Kullander & Ferreira, 2006 <sup>1,2</sup>	760	09°45'5.1"	48°21'53.0"	TDR02
	1234	10°35'50.8"	48°24'21.7"	TR7
	1881	11°15'42"	48°26'56"	SR
	1195	11°15'42"	48°26'56"	TR3
<i>Cichlasoma amazonarum</i> Kullander, 1983 <sup>1</sup>	2057	10°48'39.2"	48°06'58"	ROS
<i>Crenicichla labrina</i> (Spix & Agassiz, 1831) <sup>1</sup>	713	09°43'41.6"	48°21'33.9"	TDR01
<i>Crenicichla lepidota</i> Heckel, 1840 <sup>1</sup>	1416	11°55'38"	46°17'51.1"	IS02
	1494	10°49'09"	48°36'42.5"	TS
	1495	10°49'09"	48°36'42.5"	TS
<i>Crenicichla saxatilis</i> (Linnaeus, 1758) <sup>1</sup>	1332	10°49'2.93"	48°21'49.21"	CS
<i>Crenicichla</i> sp. <sup>1</sup>	1858	11°15'42"	48°26'56"	SR
<i>Geophagus neambi</i> Lucinda, Lucena & Assis, 2010 <sup>1,2</sup>	2096	11°15'42"	48°26'56"	TR3
	2119	10°38'54.9"	48°17'52.5"	OS
	2087	10°05'42.51"	48°22'21.76"	TR4
<i>Geophagus sveni</i> Lucinda, Lucena & Assis, 2010 <sup>1,2</sup>	2160	10°05'42.51"	48°22'21.76"	TR4
	1331	10°49'2.93"	48°21'49.21"	CS
<i>Laetacara dorsigera</i> (Heckel, 1840) <sup>1</sup>	1220	11°15'42"	48°26'56"	TR3
<i>Retroculus lapidifer</i> (Castelnau, 1855) <sup>1,2</sup>	1857	11°15'42"	48°26'56"	SR
	2178	10°58'17.95"	48°31'04.4"	TR1
	1168	10°28'22.2"	48°25'44.4"	TR6
<i>Satanoperca acuticeps</i> (Heckel, 1840) <sup>1</sup>	1584	10°14'45.8"	48°25'10.3"	TR5
	799	09°45'5.1"	48°21'53.0"	TDR02
<i>Satanoperca jurupari</i> (Heckel, 1840) <sup>2</sup>	1319	10°38'51.72"	48°23'25.98"	ES
	2137	10°58'39.31"	48°31'34.53"	TR2

Continued

Table 2. Continued.

Species	Voucher	Geographical Coordinates		Distribution
		Latitude (S)	Longitude (W)	
Order Pleuronectiformes				
Achiridae				
<i>Hypoclinemus mentalis</i> (Günther, 1862) <sup>1,2</sup>	706	09°45′5.1″	48°21′53.0″	TDR02
	1211	10°58′39.31″	48°31′34.53″	TR5
	1868	11°15′42″	48°26′56″	SR
Order Tetraodontiformes				
Tetraodontidae				
<i>Colomesus asellus</i> (Müller & Troschel, 1849) <sup>1,2</sup>	696	09°45′5.1″	48°21′53.0″	TDR02
	1342	10°58′39.31″	48°31′34.53″	TR2
	2159	10°05′42.51″	48°22′21.76″	TR4

*Mylesinus paucisquamatus* is a reophilic species endemic to the Tocantins river basin that occurs in lotic stretches of rapids (JEGU et al. 2008, LIMA & CAIRES 2011, CLARO-GARCIA & SHIBATA 2013). *Melanorivulus litteratus* is a small fish that inhabits shallow waters (20 cm deep) along the margins of rivers and streams (COSTA 2005, 2006). *Paratrygon aiereba* presents a wide geographic range in various aquatic habitats of the Amazon basin (CARVALHO et al. 2003) and exhibits low fecundity, late maturation and slow growth (ARAÚJO et al. 2004).

LUCINDA et al. (2007) discussed the poor taxonomic knowledge of the ichthyofauna in upper-middle Tocantins river basin and recognized that many species were unknown or exhibited taxonomic and nomenclatural problems. Thus, some species recorded in this study as new in the Lajeado reservoir area could be among those species mentioned by LUCINDA et al. (2007) as taxonomically unknown, for example: *Potamotrygon motoro*, *Leporinus bistratus* and *Pimelodus stewarti*. Most characids included in morphotypes by these authors were recently described as *Serrapinnus lucindai*, *Serrapinnus sterbai*, *Jupiaba citrina*, *Hemigrammus ataktos*, *Moenkhausia hysterostricta* and *Moenkhausia mikia*.

Although discussed above, some species listed in this study were actually new records because expeditions were carried out in unsampled and different habitats in the upper-middle Tocantins river basin. Among species of the order Characiformes we can cite *Anodus elongatus*, *Bivibranchia bimaculata*, *Hoplias curupira*, *Myloplus rubripinnis*, *Roeboexodon guyanensis*, *Brycon pesu* and other small characids. In Siluriformes were new records for *Ageneiosus inermis*, *Pseudopimelodus bufonius*, *Megalechis thoracata*, *Hypoptopoma gulare*, *Harttia punctata* and *Squaliforma emarginata*; and in Cichliformes, *Cichla piquiti*, *Cichlasoma amazonarum*, *Laetacara dorsigera*, *Geophagus neambi* and *Geophagus sveni*.

Many of the recorded species have uncertain taxonomic status, showing that the ichthyofauna of the upper-middle Tocantins River is still unknown, although well sampled. This reflects the high species richness and endemism of fishes in Neotropical Region (ABELL et al. 2008, ALBERT & REIS 2011) due to the evolutionary processes that led to the great diversity of these species (CASTRO 1999).

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LITERATURE CITED

ABELL, R., M.L. THIEME, C. REVENGA, M. BRYER, M. KOTTELAT, N. BOGUTSKAYA, B. COAD, N. MANDRAK, S.C. BALDERAS, W. BUS-SING, W.L.J. STIASSNY, P. SKELTON, G.R. ALLEN, P. UNMACK, A. NASEKA, R.N.G. SINDORE, N.J. ROBERTSON, E. ARMIJO, J.V. HIG-GINS, T.J. HEIBEL, E. WIKRAMANAYAKE, D. OLSON, H.L. LÓPEZ, R.E. REIS, J.G. LUNDBERG, M.H.S. PÉREZ & P. PETRY. 2008. Fresh-water ecoregions of the world: a new map of biogeographic units for freshwater biodiversity conservation. *BioScience* 58: 403–414. [https://doi.org/10.1641/0006-3568\(2008\)58\[464:nt\]2.0.co;2](https://doi.org/10.1641/0006-3568(2008)58[464:nt]2.0.co;2)

ALBERT, J.S. & R.E. REIS. 2011. *Historical biogeography of Neotropical freshwater fishes*. London: University of California Press. 408 pp.

ARAÚJO, M.L.G., P. CHARVET-ALMEIDA, M.P. ALMEIDA & H. PEREIRA. 2004. Freshwater stingrays (Potamotrygonidae): status, conserva-tion and challenges. *AC-20 Informative* 8: 1–6.

BARTOLETTE, R., R. SOUZA-LIMA, C.A.A. FIGUEIREDO, D.F. MORAES JR. & E.P. CARAMASCHI. 2012. Composição taxonômica da ictio-fauna da área da UHE Serra da Mesa; pp. 53–90, in: R. MAZZONI, E.P. CARAMASCHI & R. IGLESIAS-RIOS (eds.). *Usina Hidrelétrica de Serra da Mesa—15 anos de estudos da ictiofauna do Alto Tocan-tins*. Rio de Janeiro: Furnas Centrais Elétricas S.A.

BUCKUP, P.A., N.A. MENEZES & M.S. GHAZZI. 2007. *Catálogo dos peixes marinhos e de água doce do Brasil*. Rio de Janeiro: Museu Nacional. 196 pp.

CARVALHO, M.R., N.R. LOVEJOY & R.S. ROSA. 2003. Potamotrygoni-dae (river stingrays); pp. 22–28, in: R.E. REIS, S.O. KULLANDER & C.J. FERRARIS (eds.). *Check list of the freshwater fishes of South and Central America*. Porto Alegre: EDIPUCRS.

CASTRO, R.M.C. 1999. Evolução da ictiofauna de riachos sul-americanos: padrões gerais e possíveis processos causais, in: E.P. CARAMASCHI, R. MAZZONI & P.R. PERES-NETO (eds.). *Ecologia de peixes de Riachos: estado atual e perspectivas*. *Oecologia Brasil-iensis* 4: 139-155. <https://doi.org/10.4257/oeco.1998.0401>

CLARO-GARCÍA, A. & O.A. SHIBATTA. 2013. Fish of streams from the upper River Tocantins basin, Brazil. *Check List* 9: 28–33. <https://doi.org/10.15560/9.1.28>

COSTA, W.J.E.M. 2005. Seven new species of the killifish genus *Rivulus* (Cyprinodontiformes: Rivulidae) from the Paraná, Paraguay and upper Araguaia river basins, central Brazil. *Neotropical Ichthyol-ogy* 3: 69-82. <https://doi.org/10.1590/s1679-62252004000100002>

COSTA, W.J.E.M. 2006. Relationships and taxonomy of the killifish genus *Rivulus* (Cyprinodontiformes: Aplocheiloidei: Rivulidae) from the Brazilian Amazonas River basin, with notes on historical ecology. *Aqua* 11:133–176.

ESCHMEYER, W.N. & J.D. FONG. 2016. *Species of fishes by*

- family/subfamily. Accessed at <http://research.calacademy.org/redirect?url=http://researcharchive.calacademy.org/research/Ichthyology/catalog/fishcatmain.asp>, January 2016.
- GOULDING, M., R. BARTHEM & E.J.G. FERREIRA. 2003. The Smithsonian atlas of the Amazon. Washington, DC: Smithsonian Books. 256 pp.
- JÉGU, M., M.P. ALBRECHT & G.M. SANTOS. 2008. *Mylesinus paucisquamatus* Jégu & Santos, 1988; pp. 82–83, in: A.B.M. MACHADO, G.M. DRUMMOND & P. PAGLIA (eds.). Livro vermelho da fauna brasileira ameaçada de extinção. Brasília: Ministério do Meio Ambiente, Fundação Biodiversitas.
- LIMA, F.C.T. & R.A. CAIRES. 2011. Peixes da Estação Ecológica Serra Geral do Tocantins, bacias dos Rios Tocantins e São Francisco, com observações sobre as implicações biogeográficas das “águas emendadas” dos Rios Sapão e Galheiros. *Biota Neotropica* 11: 231–250. <https://doi.org/10.1590/s1676-06032011000100024>
- LIMA, F.C.T. & A.C. RIBEIRO. 2011. Continental-scale tectonic controls of biogeography and ecology; pp. 145–164, in: J.S. ALBERT & R.E. REIS (eds.). Historical biogeography of Neotropical freshwater fishes. Berkeley: University of California Press.
- LOWE-MCCONNELL, R.H. 1999. Estudos ecológicos de comunidades de peixes tropicais. São Paulo: EDUSP. 584 pp.
- LUCINDA, P.H.F., C.S. AGOSTINHO & R.J.D. OLIVEIRA. 2007. Fish, Lajeado reservoir, rio Tocantins drainage, state of Tocantins, Brazil. *Check List* 3: 70–83. <https://doi.org/10.15560/3.2.70>
- MÉRONA, B.J.L., A.A. JURAS, G.M. SANTOS & I.H.A. CINTRA. 2010. Os peixes e a pesca no baixo Rio Tocantins: vinte anos depois da UHE Tucuruí. Belém: Eletronorte. 215 pp.
- MMA (MINISTÉRIO DO MEIO AMBIENTE). 2014. Portaria nº 445/2014, de 18 de dezembro de 2014. Lista Nacional Oficial de Espécies da Fauna Ameaçadas de Extinção—Peixes e Invertebrados Aquáticos. *Diário Oficial da União* 256: 126–130.
- NOGUEIRA, C., P.A. BUCKUP, N.A. MENEZES, O.T. OYAKAWA, T.P. KAS-ECKER, M.B. RAMOS NETO & C.J.M. DA SILVA. 2010. Restricted-range fishes and the conservation of Brazilian freshwaters. *PLoS ONE* 5: e11390. <https://doi.org/10.1371/journal.pone.0011390>
- POLAZ, C.N.M., B.F. MELO, R. BRITZKE, E.K. RESENDE, F.A. MACHADO, J.A.F. LIMA & M. PETRERE-JR. 2014. Fishes from the Parque Nacional do Pantanal Matogrossense, upper Paraguai River basin, Brazil. *Check List* 10: 122–130. [https://doi.org/10.15560/10.1.122\\_](https://doi.org/10.15560/10.1.122_)
- RAMOS, T.P.A., R.T.C. RAMOS & S.A.Q.A. RAMOS. 2014. Ichthyofauna of the Parnaíba river basin, northeastern Brazil. *Biota Neotropica* 14: 11–18. <https://doi.org/10.1590/s1676-06020140039>
- REIS, R.E., S.O. KULLANDER & C. FERRARIS JR. 2003. Checklist of the freshwater fishes of South and Central America. Porto Alegre: EDIPUCRS, Porto Alegre. 729 pp.
- ROSSETTI, D.F. & M.M. VALERIANO. 2007. Evolution of the lowest Amazon basin modeled from the integration of geological and SRTM topographic data. *Catena* 70: 253–265. <https://doi.org/10.1016/j.catena.2006.08.009>
- SANTOS, E.P. 1994. A eficiência da pesca. *Boletim do Instituto de Pesca* 21: 71–74.
- SANTOS, G.M., A.A. JURAS, B. MERONA & M. JÉGU. 2004. Peixes do baixo rio Tocantins. 20 anos depois da Usina Hidrelétrica Tucuruí. Brasília: Eletronorte. 215 pp.
- SOARES, A.B., C.S. AGOSTINHO, P.H.F. LUCINDA & A. AKAMA. 2009. Diversidade de peixes na área de influência da barragem de Peixe Angical, antes e após a formação do reservatório; pp. 15–27, in: C.S. AGOSTINHO, F.M. PELICICE & E.E. MARQUES (eds.). Reservatório de Peixe Angical: bases ecológicas para o manejo da ictiofauna. São Carlos: RiMa.
- TORRENTE-VILARA, G., L.J. QUEIROZ & W.M. OHARA. 2013. Um breve histórico sobre o conhecimento da fauna de peixes do Rio Madeira; pp. 19–45, in: L.J. QUEIROZ, G. TORRENTE-VILARA, W.M. OHARA, T.H.S. PIRES, J. ZUANON & C.R.C. DORIA. Peixes do Rio Madeira, São Paulo: Santo Antônio Energia S. A.
- TUNDISI, J.E.M. 2006. Indicadores da qualidade da bacia hidrográfica para gestão integrada dos recursos hídricos. Estudo de caso: Bacia hidrográfica do médio Tocantins/TO [PhD thesis]. São Paulo: Universidade Federal de São Carlos. 152 pp.
- UIEDA, V.S. & R.M.C. CASTRO. 1999. Coleta e fixação de peixes de riachos; in: E.P. CARAMASCHI, R. MAZZONI & P.R. PERES-NETO (eds.). Ecologia de Peixes de Riachos: Estado Atual e Perspectivas. *Oecologia Brasiliensis* 4: 1–12. <https://doi.org/10.4257/oeco.1998.0401>
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